S/N 10/562,157

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                  Zentralblatt
 NEWS  3  OCT 19  BEILSTEIN updated with new compounds
 NEWS  4  NOV 15  Derwent Indian patent publication number format enhanced
 NEWS  5  NOV 19  WPIX enhanced with XML display format
 NEWS  6  NOV 30  ICSD reloaded with enhancements
 NEWS  7  DEC 04  LINPADOCDB now available on STN
 NEWS  8  DEC 14  BEILSTEIN pricing structure to change
 NEWS  9  DEC 17  USPATOLD added to additional database clusters
 NEWS 10  DEC 17  IMSDRUGCONF removed from database clusters and STN
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 NEWS 12  DEC 17  TOXCENTER enhanced with 2008 MeSH vocabulary in
                  MEDLINE segment
 NEWS 13  DEC 17  MEDLINE and LMEDLINE updated with 2008 MeSH vocabulary
 NEWS 14  DEC 17  CA/CAplus enhanced with new custom IPC display formats
 NEWS 15  DEC 17  STN Viewer enhanced with full-text patent content
                  from USPATOLD
 NEWS 16  JAN 02  STN pricing information for 2008 now available
 NEWS 17  JAN 16  CAS patent coverage enhanced to include exemplified
                  prophetic substances
 NEWS 18  JAN 28  USPATFULL, USPAT2, and USPATOLD enhanced with new
                  custom IPC display formats
 NEWS 19  JAN 28  MARPAT searching enhanced
 NEWS 20  JAN 28  USGENE now provides USPTO sequence data within 3 days
                  of publication
 NEWS 21  JAN 28  TOXCENTER enhanced with reloaded MEDLINE segment
 NEWS 22  JAN 28  MEDLINE and LMEDLINE reloaded with enhancements
 NEWS 23  FEB 08  STN Express, Version 8.3, now available
 NEWS 24  FEB 20  PCI now available as a replacement to DPCI
 NEWS 25  FEB 25  IFIREF reloaded with enhancements
 NEWS 26  FEB 25  IMSPRODUCT reloaded with enhancements
 NEWS 27  FEB 29  WPINDEX/WPIDS/WPIX enhanced with ECLA and current
                  U.S. National Patent Classification

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FILE 'HOME' ENTERED AT 12:34:09 ON 20 MAR 2008

=> set abbr on perm
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=> set plurals on perm
SET COMMAND COMPLETED

=> file caplus inpadoc
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FILE 'INPADOCDB' ENTERED AT 12:35:04 ON 20 MAR 2008
COPYRIGHT (C) 2008 European Patent Office / FIZ Karlsruhe

=> s ep 0011184/pn
L1           2 EP 0011184/PN

=> d l1 1-2 all

L1   ANSWER 1 OF 2  CAPLUS  COPYRIGHT 2008 ACS on STN
AN   1980:496555  CAPLUS
DN   93:96555
OREF 93:15491a,15494a
ED   Entered STN:  12 May 1984
TI   Catalyst for solution polymerization of butadiene
IN   Sylvester, Gerd; Witte, Josef; Marwede, Guenter
PA   Bayer A.-G., Fed. Rep. Ger.
SO   Ger. Offen., 22 pp.
     CODEN: GWXXBX
DT   Patent
LA   German
IC   C08F136-06; C08F004-52
CC   38-6 (Elastomers, Including Natural Rubber)
FAN.CNT 1
     PATENT NO.          KIND   DATE        APPLICATION NO.        DATE
     ---------------     ----   --------    --------------------   --------
PI   DE 2848964           A1    19800522    DE 1978-2848964        19781111
     EP 11184             A1    19800528    EP 1979-104244         19791031 <--
     EP 11184             B1    19830511
     EP 11184             B2    19880518
         R:  BE, DE, FR, GB, IT, NL
     ES 485818            A1    19800516    ES 1979-485818         19791108
     JP 55066903          A     19800520    JP 1979-144583         19791109
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     JP 63064444          B      19881212
     CA 1143711           A1     19830329    CA 1979-339569         19791109
PRAI DE 1978-2848964      A      19781111
CLASS
 PATENT NO.      CLASS  PATENT FAMILY CLASSIFICATION CODES
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 DE 2848964      IC     C08F136-06; C08F004-52
                 IPCI   C08F0136-06; C08F0136-00 [C*]; C08F0004-52; C08F0004-00
                        [C*]
                 IPCR   C08F0004-00 [I,A]; C08F0004-00 [I,C*]; C08F0004-52
                        [I,A]; C08F0004-60 [I,A]; C08F0004-72 [I,A];
                        C08F0036-00 [I,C*]; C08F0036-04 [I,A]
 EP 11184        IPCI   C08F0004-52; C08F0004-00 [C*]; C08F0036-04; C08F0036-00
                        [C*]
                 IPCR   C08F0004-00 [I,A]; C08F0004-00 [I,C*]; C08F0004-52
                        [I,A]; C08F0004-60 [I,A]; C08F0004-72 [I,A];
                        C08F0036-00 [I,C*]; C08F0036-04 [I,A]
 ES 485818       IPCI   C08F0136-06; C08F0136-00 [C*]; C08F0004-52; C08F0004-00
                        [C*]
 JP 55066903     IPCI   C08F0004-44; C08F0004-00 [C*]; C08F0036-06; C08F0036-00
                        [C*]
                 IPCR   C08F0004-00 [I,A]; C08F0004-00 [I,C*]; C08F0004-52
                        [I,A]; C08F0004-60 [I,A]; C08F0004-72 [I,A];
                        C08F0036-00 [I,C*]; C08F0036-04 [I,A]
 CA 1143711      IPCI   C08F0004-12; C08F0004-00 [C*]; C08F0036-04; C08F0036-00
                        [C*]
                 IPCR   C08F0004-00 [I,A]; C08F0004-00 [I,C*]; C08F0004-52
                        [I,A]; C08F0004-60 [I,A]; C08F0004-72 [I,A];
                        C08F0036-00 [I,C*]; C08F0036-04 [I,A]
```

AB Butadiene rubber having good building tack is prepared using mixts. of rare earth metal C8-22-neocarboxylates, Al alkyls, and Lewis acids as polymerization catalysts. Thus, stirring 2.6 kg butadiene and 25 L cyclohexane with $AlEt_3$ [97-93-8] 60, $Et_3Al_2Cl_3$ [12075-68-2] 2.4, and Nd versatate 2.0 mmol 2.5 h at 70° gives 96% rubber, microstructure cis-1,4 96.3, trans-1,4 3.1, and vinyl 0.6%. This rubber mills readily at 70°, while a com. rubber prepared with a Ti catalyst mills poorly, especially at >40°.

ST catalyst polymn butadiene rubber; butadiene rubber building tack; aluminum alkyl catalyst polymn; neodymium versatate catalyst polymn

IT Rubber, butadiene, preparation
RL: PREP (Preparation)
(manufacture of, with good building tack, catalysts for)

IT Polymerization catalysts
(rare earth metal neocarboxylates-aluminum alkyls-Lewis acids, for butadiene rubber with good building tack)

IT 7440-00-8D, salts with versatic acids
RL: CAT (Catalyst use); USES (Uses)
(catalysts, containing aluminum alkyls and Lewis acids, for polymerization of butadiene)

IT 97-93-8, uses and miscellaneous
RL: CAT (Catalyst use); USES (Uses)
(catalysts, containing rare earth metal neocarboxylates and Lewis acids, for polymerization of butadiene)

IT 12075-68-2
RL: CAT (Catalyst use); USES (Uses)
(catalysts, containing rare earth metal neocarboxylates and aluminum alkyls, for polymerization of butadiene)

IT 9003-17-2P
RL: PREP (Preparation)

```
        (rubber, butadiene; manufacture of, with good building tack, catalysts for)

L1     ANSWER 2 OF 2       INPADOCDB COPYRIGHT 2008 EPO/FIZ KA on STN

AN     4023819 INPADOCDB
TI     CATALYST, ITS MANUFACTURE AND ITS USE IN THE SOLUTION-POLYMERISATION OF
       CONJUGATED DIENES.
TL     English
IN     SYLVESTER, GERD, DR.; WITTE, JOSEF, DR.; MARWEDE, GUNTER, DR.
PA     BAYER AG
DT     Patent
PI     EP 11184              B2 19880518  German
PIT    EPB2 NEW PATENT SPECIFICATION
DAV    19880518  printed-with-grant
STA    GRANTED
DS     R:            BE DE FR GB IT NL
AI     EP 1979-104244       A  19791031
AIT    EPA Patent application
PRAI   DE 1978-2848964      A  19781111  (DEA)
PRAIT  DEA Patent application
IC.V   4
ICM    C08F004-52
ICS    C08F036-04
IPCR   C08F0004-00     [I,A ]; C08F0004-52     [I,A ]; C08F0004-60     [I,A ];
       C08F0004-72     [I,A ]; C08F0036-04     [I,A ]
       C08F0004-00     [I,C*]; C08F0036-00     [I,C*]
EPC    C08F0004-52; C08F0036-04+4/54D
FA     AI; AN; DAV; DS; DT; EPC; ICM; ICS; IN; IPC; IPCR; LA; PA; PI; PIT; PRAI;
       TI


=> s ep 0647657/pn
L2          2 EP 0647657/PN

=> d l2 1-2 all

L2   ANSWER 1 OF 2  CAPLUS  COPYRIGHT 2008 ACS on STN
AN   1995:820591  CAPLUS
DN   123:229280
ED   Entered STN:  29 Sep 1995
TI   Manufacture of catalysts for gas-phase polymerization of conjugated dienes
IN   Sylvester, Gerd; Vernaleken, Hugo
PA   Bayer A.-G., Germany
SO   Eur. Pat. Appl., 12 pp.
     CODEN: EPXXDW
DT   Patent
LA   German
IC   ICM  C08F004-52
     ICS  C08F002-34; C08F036-04
CC   35-3 (Chemistry of Synthetic High Polymers)
     Section cross-reference(s): 67
FAN.CNT 1
     PATENT NO.          KIND   DATE        APPLICATION NO.        DATE
     ---------------     ----   --------    --------------------   --------
PI   EP 647657            A1    19950412    EP 1994-115053         19940923 <--
     EP 647657            B1    19961106
         R:  DE, FR, GB, IT
     DE 4334045           A1    19950413    DE 1993-4334045        19931006
     JP 07165811          A     19950627    JP 1994-259645         19940930
     CA 2133526           A1    19950407    CA 1994-2133526        19941003
```

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     US 5908904          A      19990601    US 1997-840902         19970417
     US 5858903          A      19990112    US 1997-933597         19970918
PRAI DE 1993-4334045     A      19931006
     US 1994-312288      B3     19940926
     US 1995-513434      B1     19950810
     US 1996-632710      B1     19960415
CLASS
 PATENT NO.      CLASS  PATENT FAMILY CLASSIFICATION CODES
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 EP 647657       ICM    C08F004-52
                 ICS    C08F002-34; C08F036-04
                 IPCI   C08F0004-52 [ICM,6]; C08F0004-00 [ICM,6,C*];
                        C08F0002-34 [ICS,6]; C08F0036-04 [ICS,6]; C08F0036-00
                        [ICS,6,C*]
                 IPCR   C08F0002-34 [I,C*]; C08F0002-34 [I,A]; C08F0004-00
                        [I,C*]; C08F0004-52 [I,A]; C08F0004-54 [I,A];
                        C08F0004-60 [I,A]; C08F0036-00 [I,C*]; C08F0036-04
                        [I,A]
                 ECLA   C08F036/04+4/54D
 DE 4334045      IPCI   C08F0004-54 [ICM,6]; C08F0002-34 [ICS,6]; C08F0036-04
                        [ICS,6]; C08F0036-00 [ICS,6,C*]; C08F0004-52 [ICA,6];
                        C08F0004-00 [ICA,6,C*]
                 IPCR   C08F0002-34 [I,C*]; C08F0002-34 [I,A]; C08F0004-00
                        [I,C*]; C08F0004-52 [I,A]; C08F0004-54 [I,A];
                        C08F0004-60 [I,A]; C08F0036-00 [I,C*]; C08F0036-04
                        [I,A]
                 ECLA   C08F036/04+4/54D
 JP 07165811     IPCI   C08F0004-52 [ICM,6]; C08F0004-00 [ICM,6,C*];
                        C08F0002-34 [ICS,6]; C08F0036-04 [ICS,6]; C08F0036-00
                        [ICS,6,C*]
                 IPCR   C08F0002-34 [I,C*]; C08F0002-34 [I,A]; C08F0004-00
                        [I,C*]; C08F0004-52 [I,A]; C08F0004-54 [I,A];
                        C08F0004-60 [I,A]; C08F0036-00 [I,C*]; C08F0036-04
                        [I,A]
 CA 2133526      IPCI   C08F0004-52 [ICM,6]; C08F0004-00 [ICM,6,C*];
                        C08F0036-04 [ICS,6]; C08F0036-00 [ICS,6,C*]
                 IPCR   C08F0002-34 [I,C*]; C08F0002-34 [I,A]; C08F0004-00
                        [I,C*]; C08F0004-52 [I,A]; C08F0004-54 [I,A];
                        C08F0004-60 [I,A]; C08F0036-00 [I,C*]; C08F0036-04
                        [I,A]
 US 5908904      IPCI   C08F0002-34 [ICM,6]; C08F0004-52 [ICS,6]; C08F0004-00
                        [ICS,6,C*]
                 IPCR   C08F0002-34 [I,C*]; C08F0002-34 [I,A]; C08F0036-00
                        [I,C*]; C08F0036-04 [I,A]
                 NCL    526/153.000; 526/129.000; 526/137.000; 526/141.000;
                        526/142.000; 526/340.400; 526/901.000; 526/904.000
                 ECLA   C08F036/04+2/34; C08F036/04+4/54D
 US 5858903      IPCI   B01J0031-00 [ICM,6]
                 IPCR   C08F0004-00 [I,C*]; C08F0004-54 [I,A]; C08F0036-00
                        [I,C*]; C08F0036-04 [I,A]
                 NCL    502/118.000; 502/102.000; 502/110.000; 502/111.000;
                        502/113.000; 502/116.000; 502/117.000; 502/120.000
                 ECLA   C08F036/04+4/54D
OS   MARPAT 123:229280
```

AB The title catalysts contain rare earth alcoholates, carboxylates, and/or diketonates and/or adducts of rare earth halides with O- or N-donor compds.; di- or trialkylalanes and/or aluminoxanes; other Lewis acids; and inert, inorg. particles with sp. surface >10 m2/g and pore volume 0.3-15 mL/g. A catalyst was prepared by mixing iso-Bu2AlH 150, Et3Al2Cl3 5.0, and Nd versatate 5.0 mmol with 1.25 g butadiene and 100 g silica gel (sp.

surface 230 m2/g, pore volume 2.95 mL/g) in hexane. Polymerization of butadiene at
30-90°/400-1000 mbar in a rotary evaporator for 22 h gave 189.5 g polybutadiene with Mooney viscosity (ML 1 + 4, 100°) 147 and cis-1,4 microstructure 96.5%.

ST catalyst polymn diene gas phase; polybutadiene manuf catalyst; rare earth compd catalyst polymn; neodymium versatate catalyst polymn; diisobutylalane catalyst polymn diene; trichlorotriethyldialuminum catalyst polymn

IT Aluminoxanes
Lewis acids
Rare earth compounds
RL: CAT (Catalyst use); USES (Uses)
(manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT Carboxylic acids, uses
RL: CAT (Catalyst use); USES (Uses)
(rare earth salts; manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT Rare earth compounds
RL: CAT (Catalyst use); USES (Uses)
(alcoholates, manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT Carboxylic acids, uses
RL: CAT (Catalyst use); USES (Uses)
(branched, neodymium salts, manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT Alkadienes
RL: IMF (Industrial manufacture); PREP (Preparation)
(conjugated, polymers, manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT Ketones, uses
RL: CAT (Catalyst use); USES (Uses)
(di-, rare earth salts; manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT Polymerization catalysts
(gas-phase, manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT Alcohols, uses
RL: CAT (Catalyst use); USES (Uses)
(rare earth metal salts, manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT 1191-15-7, Diisobutylaluminum hydride 7440-00-8D, Neodymium, versatates
12075-68-2, Trichlorotriethyldialuminum
RL: CAT (Catalyst use); USES (Uses)
(manufacture of catalysts for gas-phase polymerization of conjugated dienes)

IT 9003-17-2P, Polybutadiene
RL: IMF (Industrial manufacture); PREP (Preparation)
(of cis-1,4 configuration; manufacture of catalysts for gas-phase polymerization of conjugated dienes)

L2 ANSWER 2 OF 2 INPADOCDB

AN 23338950 INPADOCDB

S/N 10/562,157

```
TI    Katalysator, dessen Herstellung und Verwendung zur
      Gasphasenpolymerisation von konjugierten Dienen.
      Catalyst, its manufacture and its use in the gas-phase polymerisation of
      conjugated dienes.
      Catalyseur, sa preparation et son application a la polymerisation en
      phase gazeuse de dienes conjugues.
TL    German; English; French
IN    SYLVESTER, GERD, DR.; VERNALEKEN, HUGO, DR.
INS   SYLVESTER GERD DR, DE; VERNALEKEN HUGO DR, DE
PA    BAYER AG
PAS   BAYER AG, DE
DT    Patent
PI    EP 647657            B1 19961106  German
PIT   EPB1 PATENT SPECIFICATION
DAV   19961106  printed-with-grant
STA   GRANTED
DS    R:            DE FR GB IT
AI    EP 1994-115053       A  19940923
AIT   EPA Patent application
PRAI  DE 1993-4334045      A  19931006  (DEA)
PRAIT DEA Patent application
IC.V  6
ICM   C08F004-52
ICS   C08F002-34; C08F036-04
IPCR  C08F0002-34     [I,A ]; C08F0004-52     [I,A ]; C08F0004-54     [I,A ];
      C08F0004-60     [I,A ]; C08F0036-04     [I,A ]
      C08F0002-34     [I,C*]; C08F0004-00     [I,C*]; C08F0036-00     [I,C*]
EPC   C08F0036-04+4/54D
FA    AI; AN; DAV; DS; DT; EPC; ICM; ICS; IN; INS; IPC; IPCR; LA; PA; PAS; PI;
      PIT; PRAI; TI


=> s ep 0563557/pn
L3           2 EP 0563557/PN

=> d l3 1-2 all

L3   ANSWER 1 OF 2  CAPLUS  COPYRIGHT 2008 ACS on STN
AN   1994:547749  CAPLUS
DN   121:147749
ED   Entered STN:  17 Sep 1994
TI   Volatile rate earth metal alkoxides, especially for the preparation of
     rare earth metal oxides, and alcohols for the synthesis of volatile
     compounds
IN   Wolfgang, Hermann; Reiner, Anwander
PA   Patent-Treuhand-Gesellschaft fuer Elektrische Gluehlampen mbH, Germany
SO   Eur. Pat. Appl., 18 pp.
     CODEN: EPXXDW
DT   Patent
LA   German
IC   ICM  C07C043-13
     ICS  C07C215-08; H01L039-24
CC   78-7 (Inorganic Chemicals and Reactions)
FAN.CNT 1
     PATENT NO.          KIND   DATE        APPLICATION NO.        DATE
     ---------------     ----   --------    --------------------   --------
PI   EP 563557            A2    19931006    EP 1993-102398         19930216 <--
     EP 563557            A3    19940420
     EP 563557            B1    19980812
         R:  DE, FR, GB, IT, NL
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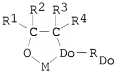
JP 06025036	A	19940201	JP 1993-84162	19930317
DE 4308695	A1	19931014	DE 1993-4308695	19930318
PRAI DE 1992-4208689	A	19920318		
EP 1993-102398	A	19930216		

CLASS

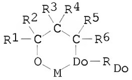
PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 563557	ICM	C07C043-13
	ICS	C07C215-08; H01L039-24
	IPCI	C07C0043-13 [ICM,5]; C07C0043-00 [ICM,5,C*]; C07C0215-08 [ICS,5]; C07C0215-00 [ICS,5,C*]; H01L0039-24 [ICS,5]
	IPCR	C07F0005-00 [I,C*]; C07F0005-00 [I,A]; C07C0029-00 [I,C*]; C07C0029-70 [I,A]; C07C0031-00 [I,C*]; C07C0031-28 [I,A]; C07C0043-00 [I,C*]; C07C0043-13 [I,A]; C07C0215-00 [I,C*]; C07C0215-44 [I,A]; C23C0016-18 [I,C*]; C23C0016-18 [I,A]
	ECLA	C07C043/13C1; C07C215/44
JP 06025036	IPCI	C07C0031-28 [ICM,5]; C07C0031-00 [ICM,5,C*]; C07C0029-70 [ICS,5]; C07C0029-00 [ICS,5,C*]; C07C0043-13 [ICS,5]; C07C0043-00 [ICS,5,C*]; C07F0005-00 [ICS,5]; C23C0016-18 [ICS,5]
	IPCR	C07F0005-00 [I,C*]; C07F0005-00 [I,A]; C07C0029-00 [I,C*]; C07C0029-70 [I,A]; C07C0031-00 [I,C*]; C07C0031-28 [I,A]; C07C0043-00 [I,C*]; C07C0043-13 [I,A]; C07C0215-00 [I,C*]; C07C0215-44 [I,A]; C23C0016-18 [I,C*]; C23C0016-18 [I,A]
DE 4308695	IPCI	C07C0043-13 [ICM,5]; C07C0041-01 [ICS,5]; C07C0041-00 [ICS,5,C*]; C07C0043-196 [ICS,5]; C07C0043-00 [ICS,5,C*]; C07C0215-44 [ICS,5]; C07C0215-08 [ICS,5]; C07C0215-00 [ICS,5,C*]; C07C0213-04 [ICS,5]; C07C0213-00 [ICS,5,C*]; C07F0007-10 [ICS,5]; C07F0007-00 [ICS,5,C*]; C23C0016-08 [ICS,5]; C23C0016-06 [ICS,5,C*]; H01J0061-06 [ICS,5]; C01F0017-00 [ICA,5]
	IPCR	C07C0043-00 [I,C*]; C07C0043-13 [I,A]; C07C0215-00 [I,C*]; C07C0215-44 [I,A]

OS MARPAT 121:147749

GI



I



II

AB Volatile rate earth metal alkoxides I and I (M = rare earth metal; R1-R6 = H, Me, Et, CHMe2, CMe3 or R2 + R3 = (CH2)3, (CH2)4 or R2 + R3 = R1 + R4 = (CH2)3; Do = donor functionality of N or O) were prepared These complexes can be used to prepare rare earth oxide thin films by MOCVD.

ST rare earth aminoalc etheralc prepn MOCVD; oxide rare earth precursor; ether alc rare earth prepn MOCVD; alc amino ether rare earth prepn

IT Rare earth oxides
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of, from rare earth aminoalcs. or ether alcs.)

IT Ketones, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)
(1,3-di-, cerium complexes, preparation of, as precursor of rare earth oxide)

IT Rare earth metals, preparation
RL: SPN (Synthetic preparation); PREP (Preparation)
(alkoxy alc. complexes, preparation of, as precursor of rare earth oxide)

IT Alcohols, preparation
RL: SPN (Synthetic preparation); PREP (Preparation)
(alkoxy, rare earth metal complexes, preparation of, as precursor of rare earth oxide)

IT Rare earth metals, preparation
RL: SPN (Synthetic preparation); PREP (Preparation)
(amino alc. complexes, preparation of, as precursor of rare earth oxide)

IT Alcohols, preparation
RL: SPN (Synthetic preparation); PREP (Preparation)
(amino, rare earth metal complexes, preparation of, as precursor of rare earth oxide)

IT 2979-24-0P, 2-Methoxycyclohexanol 7440-45-1DP, Cerium, aminoalc. and diketonato complexes 30727-29-8P, 2-(Dimethylamino)cyclohexanol 51233-74-0P, 2-Methoxycyclopentanol 51936-09-5P 71581-72-1P 142534-85-8P 142534-86-9P 142534-87-0P 142534-90-5P 155950-21-3P 155950-22-4P 155950-23-5P 155950-24-6P 155950-25-7P 156158-16-6P 156187-68-7P 156199-07-4P 156199-08-5P 156199-09-6P 156199-11-0P
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of, as precursor of rare earth oxide)

IT 1306-38-3P, Cerium dioxide, preparation 1312-81-8P, Lanthanum oxide 1314-36-9P, Yttrium oxide, preparation 12020-60-9P, Europium monoxide 12035-88-0P, Samarium monoxide 12281-29-7P, Thulium monoxide 25578-79-4P, Ytterbium monoxide
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of, from rare earth aminoalcs. or ether alcs.)

IT 41836-23-1, Neodymium(3+) bis(trimethylsilyl)amide 41836-28-6, Yttrium(3+) bis(trimethylsilyl)amide
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with aminoalcs. and ether alcs.)

IT 565-80-0, Diisopropyl ketone 630-19-3, Pivaldehyde 815-24-7, Di-tert-butyl ketone
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with chloro(ethoxymethyl)magnesium)

IT 2245-30-9
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with diethylamine)

IT 109-89-7, Diethylamine, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with dimethylbutanoxide)

IT 4279-03-2, Chloro(ethoxymethyl)magnesium
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with pivaldehyde of ketones)

L3 ANSWER 2 OF 2

AN 23254851 INPADOCDB

TI Fluechtige Seltenerdmetall Alkoxide, insbesondere zur Herstellung von Seltenerdmetall Oxiden, sowie Alkohole zum Synthetisieren von fluechtigen Verbindungen.
Volatile rate earth metal alkoxides, especially for the preparation of rare earth metal oxides, and alcohols for the synthesis of volatile compounds.
Alkoxides volatiles de terres rares, particulierement pour la preparation d'oxydes de terres rares, et des alcohols pour la synthese de composes

```
      volatiles.
TL    German; English; French
IN    WOLFGANG, HERMANN, PROF.DR.; REINER, ANWANDER
INS   WOLFGANG HERMANN PROF DR, DE; REINER ANWANDER, DE
PA    PATENT-TREUHAND-GESELLSCHAFT FUER ELEKTRISCHE GLUEHLAMPEN MBH
PAS   PATRA PATENT TREUHAND, DE
DT    Patent
PI    EP 563557           B1 19980812  German
PIT   EPB1 PATENT SPECIFICATION
DAV   19980812  printed-with-grant
STA   GRANTED
DS    R:             DE FR GB IT NL
AI    EP 1993-102398      A  19930216
AIT   EPA Patent application
PRAI  DE 1992-4208689     A  19920318  (DEA)
PRAIT DEA Patent application
IC.V  6
ICM   C07C043-13
ICS   C07C215-08; H01L039-24
IPCR  C07F0005-00     [I,A ]; C07C0029-70     [I,A ]; C07C0031-28     [I,A ];
      C07C0043-13     [I,A ]; C07C0215-44     [I,A ]; C23C0016-18     [I,A ]
      C07F0005-00     [I,C*]; C07C0029-00     [I,C*]; C07C0031-00     [I,C*];
      C07C0043-00     [I,C*]; C07C0215-00     [I,C*]; C23C0016-18     [I,C*]
EPC   C07C0043-13C1; C07C0215-44
FA    AI; AN; DAV; DS; DT; EPC; ICM; ICS; IN; INS; IPC; IPCR; LA; PA; PAS; PI;
      PIT; PRAI; TI


=> s ep 0375421/pn
L4          2 EP 0375421/PN

=> d l4 1 all

L4   ANSWER 1 OF 2  CAPLUS  COPYRIGHT 2008 ACS on STN
AN   1990:554135  CAPLUS
DN   113:154135
ED   Entered STN:  27 Oct 1990
TI   Aluminum derivatives and neodymium carboxylates as catalysts for
     stereospecific polymerization of butadiene
IN   Jenkins, Derek Keith; Ansell, Peter John
PA   Enichem Elastomers Ltd., UK
SO   Eur. Pat. Appl., 6 pp.
     CODEN: EPXXDW
DT   Patent
LA   English
IC   ICM  C08F136-06
     ICS  C08F004-52
CC   39-6 (Synthetic Elastomers and Natural Rubber)
     Section cross-reference(s): 67
FAN.CNT 1
     PATENT NO.          KIND   DATE        APPLICATION NO.        DATE
     ---------------     ----   --------    --------------------   --------
PI   EP 375421            A1    19900627    EP 1989-313438         19891221 <--
     EP 375421            B1    19931020
         R:  BE, DE, ES, FR, IT, NL
     CA 2006327           A1    19900622    CA 1989-2006327        19891221
     CA 2006327           C     19990330
     GB 2226325           A     19900627    GB 1989-28969          19891221
     GB 2226325           B     19920115
     ES 2045476           T3    19940116    ES 1989-313438         19891221
```

US 5017539 A 19910521 US 1989-454917 19891222
PRAI GB 1988-30007 A 19881222
CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 375421	ICM	C08F136-06
	ICS	C08F004-52
	IPCI	C08F0136-06 [ICM,5]; C08F0136-00 [ICM,5,C*]; C08F0004-52 [ICS,5]; C08F0004-00 [ICS,5,C*]
	IPCR	C08F0136-00 [I,C*]; C08F0136-06 [I,A]
CA 2006327	IPCI	B01J0031-04 [ICM,5]; C08F0004-12 [ICS,5]; C08F0004-00 [ICS,5,C*]
	IPCR	C08F0136-00 [I,C*]; C08F0136-06 [I,A]
GB 2226325	IPCI	C08F0004-52 [ICM,5]; C08F0004-00 [ICM,5,C*]; C08F0036-06 [ICS,5]; C08F0036-00 [ICS,5,C*]
	IPCR	C08F0136-00 [I,C*]; C08F0136-06 [I,A]
ES 2045476	IPCI	C08F0136-06 [ICM,4]; C08F0136-00 [ICM,4,C*]; C08F0004-52 [ICS,4]; C08F0004-00 [ICS,4,C*]
	IPCR	C08F0136-00 [I,C*]; C08F0136-06 [I,A]
US 5017539	IPCI	B01J0031-00 [ICM,5]; B01J0037-00 [ICS,5]
	IPCR	C08F0136-00 [I,C*]; C08F0136-06 [I,A]
	NCL	502/102.000; 502/104.000; 502/110.000; 502/117.000

AB A catalyst for the polymerization of butadiene (I) is prepared by contacting in hydrocarbon solvent (A) an Al hydrocarbyl and/or Al hydrocarbyl hydride, (B) Nd versatate (II) or Nd naphthalate, and (C) a source of halogen at -15 to -60°, and then aging the catalyst for ≥8 h prior to polymerization Thus, a catalyst must be prepared by premixing at -30° II, (iso-Bu)2AlH, dried hexane, and tert-BuCl, and then aging the composition at -20° for 20 h. Then, I was polymerized in hexane in the presence of a catalyst containing 0.15 mM Nd/100 g I at 60° for 240 min to give polybutadiene (100% conversion) showing intrinsic viscosity (PhMe at 30°) 1.77 dL/g, weight-average mol. weight 207 + 103, number-average mol. weight 77 + 103, and mol. weight distribution 2.68, compared with 2.36, 328 + 103, 110 + 103, and 3.25, for a similar catalyst prepared by premixing at 20° and aging at 20° for 20 h.

ST neodymium salt catalyst polymn butadiene; alkyl aluminum hydrate catalyst polymn butadiene; butyl chloride catalyst polymn butadiene

IT Naphthenic acids, compounds
RL: CAT (Catalyst use); USES (Uses)
(neodymium salts, catalysts, for stereospecific polymerization of butadiene)

IT Rubber, butadiene, preparation
RL: IMF (Industrial manufacture); PREP (Preparation)
(of cis-1,4-configuration, manufacture of, catalysts for, neodymium carboxylate-aluminum hydrocarbyl-halide compns. as)

IT Polymerization catalysts
(stereospecific, neodymium carboxylate-aluminum hydrocarbyl-halide compns., for butadiene)

IT 507-20-0 1191-15-7 96190-20-4
RL: CAT (Catalyst use); USES (Uses)
(catalysts containing, for stereospecific polymerization of butadiene)

IT 7440-00-8D, Neodymium, salts with naphthenic acids
RL: CAT (Catalyst use); USES (Uses)
(catalysts, for stereospecific polymerization of butadiene)

IT 9003-17-2P
RL: PREP (Preparation)
(rubber, of cis-1,4-configuration, manufacture of, catalysts for, neodymium carboxylate-aluminum hydrocarbyl-halide compns. as)

```
=> FIL STNGUIDE
COST IN U.S. DOLLARS                              SINCE FILE     TOTAL
                                                       ENTRY   SESSION
FULL ESTIMATED COST                                    31.91     32.33

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)        SINCE FILE     TOTAL
                                                       ENTRY   SESSION
CA SUBSCRIBER PRICE                                    -3.20     -3.20

FILE 'STNGUIDE' ENTERED AT 12:39:04 ON 20 MAR 2008
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FILE CONTAINS CURRENT INFORMATION.
LAST RELOADED: Mar 14, 2008 (20080314/UP).

=> file uspatall caplus japio
COST IN U.S. DOLLARS                              SINCE FILE     TOTAL
                                                       ENTRY   SESSION
FULL ESTIMATED COST                                     1.44     33.77

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)        SINCE FILE     TOTAL
                                                       ENTRY   SESSION
CA SUBSCRIBER PRICE                                     0.00     -3.20

FILE 'USPATFULL' ENTERED AT 12:53:15 ON 20 MAR 2008
CA INDEXING COPYRIGHT (C) 2008 AMERICAN CHEMICAL SOCIETY (ACS)

FILE 'USPATOLD' ENTERED AT 12:53:15 ON 20 MAR 2008
CA INDEXING COPYRIGHT (C) 2008 AMERICAN CHEMICAL SOCIETY (ACS)

FILE 'USPAT2' ENTERED AT 12:53:15 ON 20 MAR 2008
CA INDEXING COPYRIGHT (C) 2008 AMERICAN CHEMICAL SOCIETY (ACS)

FILE 'CAPLUS' ENTERED AT 12:53:15 ON 20 MAR 2008
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FILE 'JAPIO' ENTERED AT 12:53:15 ON 20 MAR 2008
COPYRIGHT (C) 2008 Japanese Patent Office (JPO)- JAPIO

=> s (rare earth or lanthan? or neodym? or samar?)(alumoxane# or aluminoxane#)
MISSING OPERATOR SAMAR?)(ALUMOXANE#
The search profile that was entered contains terms or
nested terms that are not separated by a logical operator.

=> s (rare earth or lanthan? or neodym? or samar?)(s)(alumoxane# or aluminoxane#)
L5         599 (RARE EARTH OR LANTHAN? OR NEODYM? OR SAMAR?)(S)(ALUMOXANE# OR
               ALUMINOXANE#)

=> s (polybutadiene or (butadiene or 1,3-butadiene)(3a)(polymer# or
homopolymer#))(s)(high or elevat? or increas?(6a)cis?)
   3 FILES SEARCHED...
L6       22159 (POLYBUTADIENE OR (BUTADIENE OR 1,3-BUTADIENE)(3A)(POLYMER# OR
               HOMOPOLYMER#))(S)(HIGH OR ELEVAT? OR INCREAS?(6A) CIS?)

=> s l5 and l6
L7         177 L5 AND L6
```

```
=> s l7 and (age## or aging or (pre?(1w)(form### or prepar#### or
react?))(10a)cataly?
UNMATCHED LEFT PARENTHESIS 'AND (AGE##'
The number of right parentheses in a query must be equal to the
number of left parentheses.

=> s l7 and (age## or aging or (pre?(1w)(form### or prepar#### or
react?)))(10a)cataly?
   1 FILES SEARCHED...
   3 FILES SEARCHED...
L8          21 L7 AND (AGE## OR AGING OR (PRE?(1W)(FORM### OR PREPAR#### OR
               REACT?)))(10A) CATALY?

=> d l8 1-21 ibib abs

L8   ANSWER 1 OF 21  USPATFULL on STN
ACCESSION NUMBER:       2008:17395  USPATFULL
TITLE:                  Golf ball
INVENTOR(S):            Endo, Kiyoshi, Osaka-shi, JAPAN
                        Tarao, Toshiyuki, Kobe-shi, JAPAN
PATENT ASSIGNEE(S):     Kiyoshi ENDO (non-U.S. corporation)

                             NUMBER        KIND    DATE
                        ---------------- ------ --------
PATENT INFORMATION:     US 2008015052      A1   20080117
APPLICATION INFO.:      US 2007-822106     A1   20070702  (11)

                               NUMBER        DATE
                        ------------------ --------
PRIORITY INFORMATION:   JP 2006-184880     20060704
DOCUMENT TYPE:          Utility
FILE SEGMENT:           APPLICATION
LEGAL REPRESENTATIVE:   BIRCH STEWART KOLASCH & BIRCH, PO BOX 747, FALLS
                        CHURCH, VA, 22040-0747, US
NUMBER OF CLAIMS:       16
EXEMPLARY CLAIM:        1
NUMBER OF DRAWINGS:     2 Drawing Page(s)
LINE COUNT:             768
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB      The object of the present invention is to improve the resilience and the
        durability of the golf ball to be obtained by reducing the content of
        trans-1,4-bond in a one-piece golf ball using a polybutadiene
        having a high content of cis-1,4-bond. The one-piece golf ball
        of the present invention is obtained by molding a rubber composition
        containing (a) a base rubber containing a polydiene obtained by
        polymerizing diene in the presence of a catalyst containing a
        metallosalen complex and aluminoxane, (b) a co-crosslinking
        agent, and (c) a crosslinking agent.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8   ANSWER 2 OF 21  USPATFULL on STN
ACCESSION NUMBER:       2007:303115  USPATFULL
TITLE:                  Golf ball
INVENTOR(S):            Endo, Kiyoshi, Osaka-shi, JAPAN
                        Tarao, Toshiyuki, Kobe-shi, JAPAN
PATENT ASSIGNEE(S):     SRI Sports Limited (non-U.S. corporation)

                             NUMBER        KIND    DATE
                        ---------------- ------ --------
```

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PATENT INFORMATION:     US 2007265112       A1   20071115
APPLICATION INFO.:      US 2007-798153      A1   20070510  (11)

                               NUMBER        DATE
                        ------------------ --------
PRIORITY INFORMATION:   JP 2006-133110     20060511
                        JP 2006-355732     20061228
DOCUMENT TYPE:          Utility
FILE SEGMENT:           APPLICATION
LEGAL REPRESENTATIVE:   BIRCH STEWART KOLASCH & BIRCH, PO BOX 747, FALLS
                        CHURCH, VA, 22040-0747, US
NUMBER OF CLAIMS:       16
EXEMPLARY CLAIM:        1
NUMBER OF DRAWINGS:     2 Drawing Page(s)
LINE COUNT:             986
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
```

AB The object of the present invention is to improve the resilience and the shot feeling of the golf ball to be obtained by reducing the content of trans-1,4-bond in a golf ball using for a core a polybutadiene having a high content of cis-1,4-bond. The golf ball of the present invention has a core comprising at least one layer or more and a cover covering the core, at least one layer of the core obtained by molding a rubber composition containing (a) a base rubber containing a polybutadiene obtained by polymerizing 1,3-butadiene in the presence of a catalyst containing a metallosalen complex and aluminoxane, (b) a co-crosslinking agent, and (c) a crosslinking agent.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

```
L8   ANSWER 3 OF 21  USPATFULL on STN
ACCESSION NUMBER:       2007:62884  USPATFULL
TITLE:                  Butadiene-based polymer and method of producing the
                        same as well as rubber composition and tire using the
                        same
INVENTOR(S):            Suzuki, Eiju, Tokyo, JAPAN
                        Ozawa, Yoichi, Tokyo, JAPAN
                        Ohmura, Tetsuya, Tokyo, JAPAN
                        Kurazumi, Junko, Tokyo, JAPAN

                             NUMBER       KIND    DATE
                        ---------------- ------ --------
PATENT INFORMATION:     US 2007055029      A1   20070308
APPLICATION INFO.:      US 2004-562157     A1   20040623  (10)
                        WO 2004-JP8804          20040623
                                                20051223  PCT 371 date

                               NUMBER        DATE
                        ------------------ --------
PRIORITY INFORMATION:   JP 2003-181042     20030625
DOCUMENT TYPE:          Utility
FILE SEGMENT:           APPLICATION
LEGAL REPRESENTATIVE:   SUGHRUE MION, PLLC, 2100 PENNSYLVANIA AVENUE, N.W.,
                        SUITE 800, WASHINGTON, DC, 20037, US
NUMBER OF CLAIMS:       16
EXEMPLARY CLAIM:        1
LINE COUNT:             975
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
```

AB This invention is concerned with a butadiene-based polymer having a high cis-1,4 bond content, a low

vinyl bond content and a molecular weight distribution of a specified range, and more particularly a butadiene-based polymer having a 1,3-butadiene monomer unit, characterized in that a cis-1,4 bond content and a vinyl bond content in the 1,3-butadiene monomer unit as measured by a Fourier transform infrared spectroscopy (FT-IR) is not less than 98.0% and not more than 0.3%, respectively, and a ratio (Mw/Mn) of weight average molecular weight (Mw) to number average molecular weight (Mn) is 1.6-3.5.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 4 OF 21 USPATFULL on STN

ACCESSION NUMBER: 2006:34903 USPATFULL

TITLE: Modified polymers prepared with lanthanide-based catalysts

INVENTOR(S): Ozawa, Yoichi, Tokyo, JAPAN
Miller, H. Jerrold, Panama City, FL, UNITED STATES
Masaki, Koji, Fairlawn, OH, UNITED STATES
Fujimaki, Tatsuo, Tokyo, JAPAN
Sone, Takuo, Tokyo, JAPAN
Hattori, Iwakazu, Tokyo, JAPAN
Morita, Koichi, Tokyo, JAPAN

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2006030677	A1	20060209
APPLICATION INFO.:	US 2005-244999	A1	20051006 (11)

RELATED APPLN. INFO.: Continuation of Ser. No. US 2003-296084, filed on 14 Aug 2003, PENDING A 371 of International Ser. No. WO 2000-US30743, filed on 10 Nov 2000

	NUMBER	DATE
PRIORITY INFORMATION:	US 1999-165172P	19991112 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: John M. Vasuta, Chief I.P. Counsel, Bridgestone Americas Holding, Inc., 1200 Firestone Parkway, Akron, OH, 44317, US
NUMBER OF CLAIMS: 20
EXEMPLARY CLAIM: 1
LINE COUNT: 1241
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A method for preparing a functionalized polymer comprising the steps of preparing a pseudo-living polymer by polymerizing conjugated diene monomer with a lanthanide-based catalyst, and reacting the pseudo-living polymer with at least one functionalizing agent defined by the formula (I) ##STR1## where A is a substituent that will undergo an addition reaction with a pseudo-living polymer, R.sup.1 is a divalent organic group, R.sup.2 is a monovalent organic group, and each R.sup.4, which may be the same or different, is a monovalent organic group or a substituent defined by --OR.sup.5 where R.sup.5 is a monovalent organic group, with the proviso that A, R.sup.1, R.sup.2, R.sup.4, and R.sup.5 are substituents that will not protonate a pseudo-living polymer. Also, the functionalized polymer and a vulcanizable composition containing the polymer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 5 OF 21 USPATFULL on STN

ACCESSION NUMBER: 2006:28705 USPATFULL
TITLE: Modified polymers prepared with lanthanide-based catalysts
INVENTOR(S): Ozawa, Yoichi, Tokyo, JAPAN
Miller, H. Jerrold, Panama City, FL, UNITED STATES
Masaki, Koji, Fairlawn, OH, UNITED STATES

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2006025539	A1	20060202
APPLICATION INFO.:	US 2005-243874	A1	20051005 (11)

RELATED APPLN. INFO.: Continuation of Ser. No. US 2003-296082, filed on 13 Aug 2003, GRANTED, Pat. No. US 6977281 A 371 of International Ser. No. WO 2000-US30875, filed on 10 Nov 2000

	NUMBER	DATE
PRIORITY INFORMATION:	US 1999-165169P	19991112 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Renner, Kenner, Greive, Bobak, Taylor & Weber, Fourth Floor, First National Tower, Akron, OH, 44308, US
NUMBER OF CLAIMS: 22
EXEMPLARY CLAIM: 1
LINE COUNT: 992
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A method for preparing a functionalized polymer comprising the steps of preparing a pseudo-living polymer by polymerizing conjugated diene monomer with a lanthanide-based catalyst, where said pseudo-living polymer is characterized by having greater than about 85 percent of the polymer in the cis microstructure and less than about 3 percent of the polymer is in the 1,2- or 3,4-microstructure, and reacting the pseudo-living polymer with at least one functionalizing agent defined by the formula (I) or (II) ##STR1## where Z is a substituent that will react or interact with organic or inorganic fillers; R.sup.1 is a single bond or a divalent organic group; R.sup.2 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.13 or R.sup.14; R.sup.3 is a single bond, a divalent organic group, or a trivalent organic group that forms a cyclic organic group with R.sup.4 or R.sup.5; R.sup.13 is a single bond, a divalent organic group, or a trivalent organic group that forms a cyclic organic group with R.sup.2 or R.sup.14; R.sup.4 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.3 or R.sup.5; R.sup.14 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.2 or R.sup.13; and R.sup.5 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.3 or R.sup.4; with the proviso that each group attached to the imino carbon is attached via a carbon atom and R.sup.1, R.sup.2 R.sup.3, R.sup.4, R.sup.5, R.sup.13, R.sup.14 and Z are substituents that will not protonate a pseudo-living polymer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 6 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2006:23933 USPATFULL
TITLE: Modified polymers prepared with lanthanide-based catalysts
INVENTOR(S): Ozawa, Yoichi, Kodaira, JAPAN
Miller, H. Jerrold, Panama City, FL, UNITED STATES

```
                        Masaki, Koji, Fairlawn, OH, UNITED STATES
                        Fujimaki, Tatsuo, Higashimurayama, JAPAN
                        Sone, Takuo, Tokyo, JAPAN
                        Hattori, Iwakazu, Tokyo, JAPAN
                        Morita, Koichi, Higashiyamato, JAPAN
PATENT ASSIGNEE(S):     Bridgestone Corporation, Tokyo, JAPAN (non-U.S.
                        corporation)

                             NUMBER       KIND    DATE
                        ---------------- ------ --------
PATENT INFORMATION:     US 6992147        B1   20060131
                        WO 2001034658          20010517
APPLICATION INFO.:      US 2002-296084         20001110  (10)
                        WO 2000-US30743        20001110
                                               20030814  PCT 371 date

                               NUMBER        DATE
                        ------------------ --------
PRIORITY INFORMATION:   US 1999-165172P    19991112 (60)
DOCUMENT TYPE:          Utility
FILE SEGMENT:           GRANTED
PRIMARY EXAMINER:       Choi, Ling-Sui
LEGAL REPRESENTATIVE:   Reginelli, Arthur M.
NUMBER OF CLAIMS:       14
EXEMPLARY CLAIM:        1
LINE COUNT:             1158
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
```

AB   A method for preparing a functionalized polymer comprising the steps of preparing a pseudo-living polymer by polymerizing conjugated diene monomer with a lanthanide-based catalyst, and reacting the pseudo-living polymer with at least one functionalizing agent defined by the formula (I) ##STR1## where A is a substituent that will undergo an addition reaction with a pseudo-living polymer, R.sup.1 is a divalent organic group, R.sup.2 is a monovalent organic group, and each R.sup.4, which may be the same or different, is a monovalent organic group or a substituent defined by --OR.sup.5 where R.sup.5 is a monovalent organic group, with the proviso that A, R.sup.1, R.sup.2, R.sup.4, and R.sup.5 are substituents that will not protonate a pseudo-living polymer. Also, the functionalized polymer and a vulcanizable composition containing the polymer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

```
L8   ANSWER 7 OF 21  USPATFULL on STN
ACCESSION NUMBER:       2006:4672  USPATFULL
TITLE:                  Functionalized high cis-1,4-
                        polybutadiene prepared using novel
                        functionalizing agents
INVENTOR(S):            Ozawa, Yoichi, Tokyo, JAPAN
                        Miller, H. Jerrold, Savannah, GA, UNITED STATES
                        Masaki, Koji, Fairlawn, OH, UNITED STATES
                        Morita, Koichi, Tokyo, JAPAN
                        Fujimaki, Tatsuo, Tokyo, JAPAN
                        Ohumura, Tetsuyo, Tokyo, JAPAN
                        Sone, Takuo, Tokyo, JAPAN
                        Hattori, Iwakazu, Tokyo, JAPAN

                             NUMBER       KIND    DATE
                        ---------------- ------ --------
PATENT INFORMATION:     US 2006004131     A1   20060105
```

APPLICATION INFO.: US 2005-216559 A1 20050831 (11)
RELATED APPLN. INFO.: Continuation of Ser. No. US 2003-381829, filed on 22 Sep 2003, PENDING A 371 of International Ser. No. WO 2000-US30969, filed on 10 Nov 2000
DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Renner, Kenner, Greive, Bobak, Taylor & Weber, First National Tower, Fourth Floor, Arkron, OH, 44308, US
NUMBER OF CLAIMS: 21
EXEMPLARY CLAIM: 1-20
LINE COUNT: 838
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A functionalized polymer prepared by a process comprising the steps of preparing a pseudo-living polymer by polymerizing conjugated monomer with a lanthanide-based catalyst, and reacting the pseudo-living polymer with a functionalizing agent defined by the formula (I) A-R.sup.1-Z (I) where R.sup.1 is a divalent bond or divalent organic group comprising from 0 to about 20 carbon atoms, A is a substituent that will undergo an addition reaction with a pseudo-living polymer, and Z is a substituent that will react or interact with silica or carbon black reinforcing fillers, with the proviso that A, R.sup.1, and Z are substituents that will not protonate a pseudo-living polymer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 8 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2005:320570 USPATFULL
TITLE: Modified polymers prepared with lanthanide-based catalysts
INVENTOR(S): Ozawa, Yoichi, Kodaira, JAPAN
Miller, H. Jerrold, Panama City, FL, UNITED STATES
Masaki, Koji, Fairlawn, OH, UNITED STATES
PATENT ASSIGNEE(S): Bridgestone Corporation, Tokyo, JAPAN (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6977281	B1	20051220	
	WO 2001034659		20010517	
APPLICATION INFO.:	US 2002-296082		20001110	(10)
	WO 2000-US30875		20001110	
			20030813	PCT 371 date

	NUMBER	DATE
PRIORITY INFORMATION:	US 1999-165169P	19991112 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: GRANTED
PRIMARY EXAMINER: Choi, Ling-Sui
LEGAL REPRESENTATIVE: Reginelli, Arthur M.
NUMBER OF CLAIMS: 15
EXEMPLARY CLAIM: 1
LINE COUNT: 940
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A method for preparing a functionalized polymer comprising the steps of preparing a pseudo-living polymer by polymerizing conjugated diene monomer with a lanthanide-based catalyst, where said pseudo-living polymer is characterized by having greater than about 85 percent of the polymer in the cis microstructure and less than about 3 percent of the

polymer is in the 1,2- or 3,4-microstructure, and reacting the pseudo-living polymer with at least one functionalizing agent defined by the formula (I) or (II) ##STR1## where Z is a substituent that will react or interact with organic or inorganic fillers; R.sup.1 is a single bond or a divalent organic group; R.sup.2 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.13 or R.sup.14; R.sup.3 is a single bond, a divalent organic group, or a trivalent organic group that forms a cyclic organic group with R.sup.4 or R.sup.5; R.sup.13 is a single bond, a divalent organic group, or a trivalent organic group that forms a cyclic organic group with R.sup.2 or R.sup.14; R.sup.4 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.3 or R.sup.5; R.sup.14 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.2 or R.sup.13; and R.sup.5 is a monovalent organic group or a divalent organic group that forms a cyclic organic group with R.sup.3 or R.sup.4; with the proviso that each group attached to the imino carbon is attached via a carbon atom and R.sup.1, R.sup.2, R.sup.3, R.sup.4, R.sup.5, R.sup.13, R.sup.14 and Z are substituents that will not protonate a pseudo-living polymer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 9 OF 21 USPATFULL on STN

ACCESSION NUMBER:	2005:127021 USPATFULL			
TITLE:	Branched olefinic macromonomer, olefin graft copolymer, and olefin resin composition			
INVENTOR(S):	Machida, Shuji, Ichihara, JAPAN Sato, Kazuo, Ichihara, JAPAN Tatsumi, Tomio, Ichihara, JAPAN Goto, Yasuhiro, Ichihara, JAPAN			
PATENT ASSIGNEE(S):	Idemitsu Kosan Co., Ltd., Tokyo, JAPAN (non-U.S. corporation)			
	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6897261	B1	20050524	
	WO 2001007493		20010201	
APPLICATION INFO.:	US 2001-19293		20000718	(10)
	WO 2000-JP4811		20000718	
			20020104	PCT 371 date

	NUMBER	DATE
PRIORITY INFORMATION:	JP 1999-210543	19990726
	JP 2001-11299006	19991021

DOCUMENT TYPE:	Utility
FILE SEGMENT:	GRANTED
PRIMARY EXAMINER:	Lu, Caixia
LEGAL REPRESENTATIVE:	Oblon, Spivak, McClelland, Maier & Neustadt, P.C.
NUMBER OF CLAIMS:	10
EXEMPLARY CLAIM:	1
NUMBER OF DRAWINGS:	0 Drawing Figure(s); 0 Drawing Page(s)
LINE COUNT:	3739

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention relates to olefin branched macromonomers, olefin graft copolymers and olefin resin compositions having the advantage of good compatibility with polyolefin resins and good moldability and workability. The olefin branched macromonomer satisfies the following (a) and (b):

(a) its weight-average molecular weight (Mw) measured through gel permeation chromatography (GPC) falls between 400 and 200000;
(b) its vinyl content is at least 70 mol % of all the unsaturated groups in the macromonomer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 10 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2005:105445 USPATFULL
TITLE: Metal complex compositions and their use as catalysts to produce polydienes
INVENTOR(S): Thiele, Sven K-H, Halle D-06110, GERMANY, FEDERAL REPUBLIC OF
Monroy, Victor M, Charlotte, NC, UNITED STATES
Stoye, Hartmut, Halle D-06110, GERMANY, FEDERAL REPUBLIC OF
Wilson, David R, Midland, MI, UNITED STATES

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 2005090383	A1	20050428	
APPLICATION INFO.:	US 2003-489370	A1	20021007	(10)
	WO 2002-US31989		20021007	

	NUMBER	DATE
PRIORITY INFORMATION:	US 2001-60328935	20011012
	US 2003-60328937	20011012
	US 2003-60604866	20020821

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: THE DOW CHEMICAL COMPANY, INTELLECTUAL PROPERTY SECTION, P. O. BOX 1967, MIDLAND, MI, 48641-1967, US
NUMBER OF CLAIMS: 25
EXEMPLARY CLAIM: 1
LINE COUNT: 3382
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB This invention relates to metal complex compositions, their preparation and their use as catalysts to produce polymers of conjugate dienes through polymerization of conjugated diene monomers. The used metal complex compositions are transition metal compounds in combination with an activator compound, optionally with a transition metal halide compound and optionally a catalyst modifier and optionally an inorganic or organic support material. The metal complexes comprises metals of group 3 to 10 of the Periodic System of the Elements in combination with activators, and optionally transition metal halide compounds of groups 3 to 10 of the Periodic Table of the Elements including lanthanide metals and actinide metals and optionally, catalyst modifiers, especially Lewis acids and optionally an inorganic or organic support material. More in particular the invention relates metal complex compositions, their preparation and their use as catalysts to produce homopolymers of conjugated dienes, preferably, but not limited to, through polymerization of 1,3-butadiene or isoprene.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 11 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2004:306582 USPATFULL
TITLE: Random or block co-or terpolymers produced by using of metal complex catalysts

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INVENTOR(S):             Thiele, Sven K H, Halle, GERMANY, FEDERAL REPUBLIC OF
                         Monroy, Victor M., Charlotte, NC, UNITED STATES
                         Wilson, David R., Midland, MI, UNITED STATES

                              NUMBER        KIND    DATE
                         ---------------- ------ --------
PATENT INFORMATION:      US 2004241251      A1   20041202
APPLICATION INFO.:       US 2003-474145     A1   20031003  (10)
                         WO 2002-US13830         20020430

                                NUMBER        DATE
                         ------------------ --------
PRIORITY INFORMATION:    US 2001-288859P    20010504 (60)
DOCUMENT TYPE:           Utility
FILE SEGMENT:            APPLICATION
LEGAL REPRESENTATIVE:    THE DOW CHEMICAL COMPANY, INTELLECTUAL PROPERTY
                         SECTION, P. O. BOX 1967, MIDLAND, MI, 48641-1967
NUMBER OF CLAIMS:        27
EXEMPLARY CLAIM:         1
LINE COUNT:              1415
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
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AB Random or block co- or terpolymers produced by using metal complex catalysts in a reaction of one conjugated diene monomer with one aromatic Random or block co- or terpolymers produced by using metomers with one aromatic α-olefin or terpolymers of one conjugated diene monomer with one aromatic α-olefin and one aliphatic α-olefin by using metal complexes comprising metals of group 3 to 10 of the Periodic System of the Elements in combination with activators and optionally a support material. More particularly the metal complexes used for the synthesis of co- or terpolymer are lanthanide metals. Even more particularly diene monomer(s) and aromatic α-olefin monomer(s) such as, but not limited to, butadiene and styrene or isoprene and styrene are copolymerized giving random or block copolymers or butadiene, styrene and isoprene are terpolymerized giving random or block terpolymers using metal complexes comprising lanthanide metals in combination with activators and optionally a support material. Preferably random co- or terpolymers are formed.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

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L8   ANSWER 12 OF 21  USPATFULL on STN
ACCESSION NUMBER:        2004:152416  USPATFULL
TITLE:                   Continuous process for the production of conjugated
                         diene polymers having narrow molecular weight
                         distribution and products therefrom
INVENTOR(S):             Ozawa, Yoichi, Tokyo, JAPAN
                         Roggeman, David M., North Royalton, OH, UNITED STATES
                         Miller, H. Jerrold, Savannah, GA, UNITED STATES
                         Masaki, Koji, Tokyo, JAPAN
                         Luo, Steven, Akron, OH, UNITED STATES
                         Antkowiak, Thomas A., Rittman, OH, UNITED STATES

                              NUMBER        KIND    DATE
                         ---------------- ------ --------
PATENT INFORMATION:      US 2004116638      A1   20040617
                         US 6897270         B2   20050524
APPLICATION INFO.:       US 2004-468516     A1   20040120  (10)
                         WO 2002-US6105          20020228
DOCUMENT TYPE:           Utility
FILE SEGMENT:            APPLICATION
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LEGAL REPRESENTATIVE: John M Vasuta, Chief IP Counsel, Bridgestone Americas Holding Inc, 1200 Firestone Parkway, Akron, OH, 44317
NUMBER OF CLAIMS: 15
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 2 Drawing Page(s)
LINE COUNT: 1193
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A continuous process for producing conjugated diene polymers comprising the steps of contacting, within an hydrocarbon solvent and within a continuous reactor, conjugated diene monomer and a catalyst composition prepared by combining: (a) a lanthanide compound, (b) an alkylating agent, and (c) a halogen-containing compound, and maintaining a non-ideal flow pattern within the continuous reactor so that 10% of the reagents entering the reactor at a reference time t.sub.0 are still present within the continuous reactor at a time t.sub.0+xt.sub.rt, where t.sub.rt is the residence time corresponding to ideal flow within the continuous reactor and x is a numeral greater than 1.5.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 13 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2003:251487 USPATFULL
TITLE: Lanthanide-based catalyst composition for the manufacture of polydienes
INVENTOR(S): Luo, Steven, Akron, OH, UNITED STATES
Ozawa, Yoichi, Tokyo, JAPAN
Masaki, Koji, Fairlawn, OH, UNITED STATES
Lawson, David, Uniontown, OH, UNITED STATES

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 2003176276	A1	20030918	
	US 6699813	B2	20040302	
APPLICATION INFO.:	US 2002-287205	A1	20021104	(10)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2001-337728P	20011107 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: John M. Vasuta, Chief I. P. Counsel, Bridgestone/Firestone, Inc., 1200 Firestone Parkway, Akron, OH, 44317
NUMBER OF CLAIMS: 20
EXEMPLARY CLAIM: 1
LINE COUNT: 1179
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst composition that is the combination of or the reaction product of ingredients comprising (a) an lanthanide compound, (b) an alkylating agent, (c) a nickel-containing compound, and optionally (d) a halogen-containing compound, with the proviso that the halogen-containing compound must be present where none of the lanthanide compound, the alkylating agent, and the nickel-containing compound contain a labile halogen atom.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 14 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2003:127814 USPATFULL
TITLE: Copolymers prepared by using both anionic

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                          polymerization techniques and coordination catalysts
INVENTOR(S):              Ozawa, Yoichi, Tokyo, JAPAN

                               NUMBER        KIND    DATE
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PATENT INFORMATION:       US 2003088029      A1   20030508
                          US 6765066         B2   20040720
APPLICATION INFO.:        US 2002-169390     A1   20020628  (10)
                          WO 2000-US35569         20001229
DOCUMENT TYPE:            Utility
FILE SEGMENT:             APPLICATION
LEGAL REPRESENTATIVE:     John H Hornickel, Bridgestone Firestone Americas
                          Holding, 1200 Firestone Parkway, Akron, OH, 44317
NUMBER OF CLAIMS:         10
EXEMPLARY CLAIM:          1
LINE COUNT:               586
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB     A process for forming a copolymer comprising the steps of (i) preparing
       a living polymer segment by using anionic polymerization techniques,
       (ii) modifying the living polymer by reacting it with an alkyl metal
       halide to form an organometallic polymeric intermediate, and (iii)
       preparing a second polymer segment from the organometallic polymeric
       intermediate by combining the intermediate, conjugated diene monomer,
       and a coordination catalyst that will polymerize the conjugated diene
       monomer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8   ANSWER 15 OF 21  USPATFULL on STN
ACCESSION NUMBER:         2002:209730  USPATFULL
TITLE:                    Low molecular weight high-cis
                          polybutadienes and their use in high
                          molecular weight-low molecular weight high
                          -cis polybutadiene blends
INVENTOR(S):              Miller, H. Jerrold, Akron, OH, United States
                          Hamada, Tatsuro, Copley, OH, United States
                          Ozawa, Yoichi, Copley, OH, United States
                          Pakdel, Peyman, Akron, OH, United States
PATENT ASSIGNEE(S):       Bridgestone Corporation, Tokyo, JAPAN (non-U.S.
                          corporation)

                               NUMBER        KIND    DATE
                          ---------------- ------ --------
PATENT INFORMATION:       US 6437205         B1   20020820
                          WO 2000069928           20001123
APPLICATION INFO.:        US 2000-600150          20000710  (9)
                          WO 2000-US14098         20000519
                                                  20000710  PCT 371 date
RELATED APPLN. INFO.:     Continuation of Ser. No. US 1999-314203, filed on 19
                          May 1999 Continuation of Ser. No. US 1999-314791, filed
                          on 19 May 1999
DOCUMENT TYPE:            Utility
FILE SEGMENT:             GRANTED
PRIMARY EXAMINER:         Howard, Jacqueline V.
LEGAL REPRESENTATIVE:     Palmer, Meredith, Fry, Jude
NUMBER OF CLAIMS:         78
EXEMPLARY CLAIM:          1
NUMBER OF DRAWINGS:       0 Drawing Figure(s); 0 Drawing Page(s)
LINE COUNT:               1371
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
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AB A process for polymerizing 1,3-butadiene into a low molecular weight high-cis polybutadiene is described using a catalyst system comprising: (a) a neodymium-containing compound, (b) an aluminoxane or a trialkyl aluminum compound, (c) an organoaluminum hydride, and (d) a halogen source. A blend of a high molecular weight high-cis polybutadiene and the low molecular weight high-cis polybutadiene is also disclosed for use in pneumatic tire treads. Desirably both the high and the low molecular weight polymers have high cis contents, with the low molecular weight polymer being at least 70 percent cis and the high molecular weight polymer being at least 92 percent cis. Desirably both polymers are made with a neodymium catalyst system. The blends provide a balance of properties including good snow traction, wet traction, and rolling resistance while providing a balance of good physical properties including tension at break, modulus etc.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 16 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2002:102437 USPATFULL
TITLE: Catalyst with a base consisting of compounds of the rare earth metals for polymerizing unsaturated organic compounds
INVENTOR(S): Windisch, Heike, Leverkusen, GERMANY, FEDERAL REPUBLIC OF
PATENT ASSIGNEE(S): Bayer Aktiengesellschaft, Leverkusen, GERMANY, FEDERAL REPUBLIC OF (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6383971	B1	20020507	
	WO 9920670		19990429	
APPLICATION INFO.:	US 2000-529767		20000418	(9)
	WO 1998-EP6376		19981007	
			20000418	PCT 371 date

	NUMBER	DATE
PRIORITY INFORMATION:	DE 1997-19746266	19971020

DOCUMENT TYPE: Utility
FILE SEGMENT: GRANTED
PRIMARY EXAMINER: Wu, David W.
ASSISTANT EXAMINER: Lee, Rip A
LEGAL REPRESENTATIVE: Gil, Joseph C., Henderson, Richard E. L.
NUMBER OF CLAIMS: 8
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 0 Drawing Figure(s); 0 Drawing Page(s)
LINE COUNT: 471
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention relates to new catalysts based on compounds of the rare earth metals containing a compound of the rare earth metals, a cyclopentadiene, and an alumoxane, as well as the use of new catalysts for the polymerisation of unsaturated compounds, particularly conjugated dienes. With the new catalyst system it is possible in the polymerisation of conjugated dienes to obtain a substantially higher proportion of laterally bound vinyl groups in the polymers.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 17 OF 21 USPATFULL on STN

ACCESSION NUMBER:	1998:39615 USPATFULL
TITLE:	Process for preparing olefin polymer, and ethylenic polymer
INVENTOR(S):	Tazaki, Toshinori, Sodegaura, Japan Machida, Shuji, Sodegaura, Japan Kawasaki, Nobuo, Sodegaura, Japan Yabunouchi, Nobuhiro, Sodegaura, Japan Kadoi, Yasunori, Sodegaura, Japan Takeuchi, Mizutomo, Sodegaura, Japan Nakacho, Kenji, Sodegaura, Japan Shikuma, Haruo, Sodegaura, Japan Tani, Noriyuki, Sodegaura, Japan
PATENT ASSIGNEE(S):	Idemitsu Kosan Co., Ltd., Tokyo, Japan (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 5739225		19980414	
	WO 9518158		19950706	
APPLICATION INFO.:	US 1996-666471		19960628	(8)
	WO 1994-JP2251		19941227	
			19960628	PCT 371 date
			19960628	PCT 102(e) date

	NUMBER	DATE
PRIORITY INFORMATION:	JP 1993-334403	19931228
	JP 1994-75691	19940414
	JP 1994-172643	19940725

DOCUMENT TYPE:	Utility
FILE SEGMENT:	Granted
PRIMARY EXAMINER:	Wu, David W.
LEGAL REPRESENTATIVE:	Oblon, Spivak, McClelland, Maier & Neustadt, P.C.
NUMBER OF CLAIMS:	11
EXEMPLARY CLAIM:	1
NUMBER OF DRAWINGS:	2 Drawing Figure(s); 2 Drawing Page(s)
LINE COUNT:	1618

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An olefin polymer is prepared by homopolymerizing an olefin or copolymerizing two different olefins or an olefin and another polymerizable unsaturated compound in the presence of a polymerization catalyst containing (A) a transition metal compound represented by the formula (I):

CpML.sub.x-1 (I)

wherein M is a metallic element of Groups 3 to 10 of the Periodic Table or a metallic element of the lanthanide series; Cp is a cyclic compound group having a cyclopentadienyl skeleton of 5 to 30 carbon atoms; L is R', OR', SR', SO.sub.3 R'N'R'R", PR'R", wherein R' and R" are each a C.sub.1-20 hydrocarbon group or a silyl group, NO.sub.2, a halogen atom, a 1-pyrrolyl group or a 1-pyrrolidinyl group, with the proviso that at least one of the L groups is OR', SR', N'R'R" or PR'R", wherein R' and R" are each a C.sub.1-20 hydrocarbon group or a silyl group; and x is a valence number of M, and when a plurality of L's are present, the respective L's may be the same or different, and (B) an aluminoxane, wherein the molar ratio of the component (B)/component (A) (in terms of the metallic atoms) is in the range of 2

to 500.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 18 OF 21 USPATFULL on STN
ACCESSION NUMBER: 86:14022 USPATFULL
TITLE: Olefin polymerization
INVENTOR(S): Hsieh, Henry L., Bartlesville, OK, United States
Yeh, Gene H. C., Bartlesville, OK, United States
PATENT ASSIGNEE(S): Phillips Petroleum Company, Bartlesville, OK, United States (U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 4575538		19860311	
APPLICATION INFO.:	US 1984-684407		19841220	(6)

DOCUMENT TYPE: Utility
FILE SEGMENT: Granted
PRIMARY EXAMINER: Garvin, Patrick P.
LEGAL REPRESENTATIVE: Doescher, Howard D.
NUMBER OF CLAIMS: 29
EXEMPLARY CLAIM: 10
LINE COUNT: 1114
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process for producing a novel-highly active lanthanide containing catalysts comprising products formed by reacting a lanthanide halide, and an electron doner ligand with an organometal cocatalyst component and its use in the polymerization of olefins, especially olefins such as ethylene, 1,3-butadiene, isoprene and the like. In one embodiment, an organic base is used to increase catalyst activity in those instances where rare earth metal halide-ligand complex is formed with a ligand containing an acidic proton. In another embodiment, diolefins and vinyl aromatics are polymerized in a two-stage process employing a lanthanide complex-organometal cocatalyst in the first stage and a free radical initiator in the second stage.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 19 OF 21 USPAT2 on STN
ACCESSION NUMBER: 2004:152416 USPAT2
TITLE: Continuous process for the production of conjugated diene polymers having narrow molecular weight distribution and products therefrom
INVENTOR(S): Ozawa, Yoichi, Kodaira, JAPAN
Roggeman, David M., North Royalton, OH, UNITED STATES
Miller, H. Jerrold, Savannah, GA, UNITED STATES
Masaki, Koji, Hagashimurayama, JAPAN
Luo, Steven, Akron, OH, UNITED STATES
Antkowiak, Thomas A., Rittman, OH, UNITED STATES
PATENT ASSIGNEE(S): Bridgestone Corporation, Tokyo, JAPAN (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6897270	B2	20050524	
	WO 2002006848		20020906	
APPLICATION INFO.:	US 2004-468516		20020228	(10)
	WO 2002-US6105		20020228	
			20040120	PCT 371 date

	NUMBER	DATE
PRIORITY INFORMATION:	US 2001-272154P	20010228 (60)
	US 2004-290928P	20010515 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: GRANTED
PRIMARY EXAMINER: Teskin, Fred
LEGAL REPRESENTATIVE: Reginelli, Arthur M.
NUMBER OF CLAIMS: 14
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 3 Drawing Figure(s); 2 Drawing Page(s)
LINE COUNT: 1185
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A continuous process for producing conjugated diene polymers comprising the steps of contacting, within an hydrocarbon solvent and within a continuous reactor, conjugated diene monomer and a catalyst composition prepared by combining: (a) a lanthanide compound, (b) an alkylating agent, and (c) a halogen-containing compound, and maintaining a non-ideal flow pattern within the continuous reactor so that 10% of the reagents entering the reactor at a reference time t.sub.0 are still present within the continuous reactor at a time t.sub.0+xt.sub.rt, where t.sub.rt is the residence time corresponding to ideal flow within the continuous reactor and x is a numeral greater than 1.5.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 20 OF 21 USPAT2 on STN
ACCESSION NUMBER: 2003:251487 USPAT2
TITLE: Lanthanide-based catalyst composition for the manufacture of polydienes
INVENTOR(S): Luo, Steven, Akron, OH, United States
Ozawa, Yoichi, Kodaira, JAPAN
Masaki, Koji, Fairlawn, OH, United States
Lawson, David, Uniontown, OH, United States
PATENT ASSIGNEE(S): Bridgestone Corporation, Tokyo, JAPAN (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6699813	B2	20040302	
APPLICATION INFO.:	US 2002-287205		20021104	(10)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2001-337728P	20011107 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: GRANTED
PRIMARY EXAMINER: Wood, Elizabeth
LEGAL REPRESENTATIVE: Reginelli, Arthur M.
NUMBER OF CLAIMS: 30
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 0 Drawing Figure(s); 0 Drawing Page(s)
LINE COUNT: 1267
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A catalyst composition that is the combination of or the reaction product of ingredients comprising (a) an lanthanide compound, (b) an alkylating agent, (c) a nickel-containing compound, and optionally (d) a halogen-containing compound, with the proviso that the halogen-containing compound must be present where none of the lanthanide compound, the alkylating agent, and the nickel-containing compound

contain a labile halogen atom.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 21 OF 21 USPAT2 on STN
ACCESSION NUMBER: 2003:127814 USPAT2
TITLE: Copolymers prepared by using both anionic polymerization techniques and coordination catalysts
INVENTOR(S): Ozawa, Yoichi, Tokyo, JAPAN
PATENT ASSIGNEE(S): Bridgestone Corporation, Tokyo, JAPAN (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6765066	B2	20040720	
	WO 2001049764		20010712	
APPLICATION INFO.:	US 2002-169390		20020628	(10)
	WO 2000-US35569		20001229	

	NUMBER	DATE
PRIORITY INFORMATION:	US 1999-173698P	19991230 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: GRANTED
PRIMARY EXAMINER: Seidleck, James J.
ASSISTANT EXAMINER: Asinovsky, Olga
LEGAL REPRESENTATIVE: Reginelli, Arthur
NUMBER OF CLAIMS: 20
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 0 Drawing Figure(s); 0 Drawing Page(s)
LINE COUNT: 605
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A process for forming a copolymer comprising the steps of (i) preparing a living polymer segment by using anionic polymerization techniques, (ii) modifying the living polymer by reacting it with an alkyl metal halide to form an organometallic polymeric intermediate, and (iii) preparing a second polymer segment from the organometallic polymeric intermediate by combining the intermediate, conjugated diene monomer, and a coordination catalyst that will polymerize the conjugated diene monomer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

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L8 ANSWER 15 OF 21 USPATFULL on STN
ACCESSION NUMBER: 2002:209730 USPATFULL
TITLE: Low molecular weight high-cis polybutadienes and their use in high molecular weight-low molecular weight high -cis polybutadiene blends
INVENTOR(S): Miller, H. Jerrold, Akron, OH, United States
Hamada, Tatsuro, Copley, OH, United States
Ozawa, Yoichi, Copley, OH, United States
Pakdel, Peyman, Akron, OH, United States
PATENT ASSIGNEE(S): Bridgestone Corporation, Tokyo, JAPAN (non-U.S. corporation)

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CAS INDEXING IS AVAILABLE FOR THIS PATENT.

TI Low molecular weight high-cis polybutadienes and their use in high molecular weight-low molecular weight high-cis polybutadiene blends

AB A process for polymerizing 1,3-butadiene into a low molecular weight high-cis polybutadiene is described using a catalyst system comprising: (a) a neodymium-containing compound, (b) an aluminoxane or a trialkyl aluminum compound, (c) an organoaluminum hydride, and (d) a halogen source. A blend of a high molecular weight high-cis polybutadiene and the low molecular weight high-cis polybutadiene is also disclosed for use in pneumatic tire treads. Desirably both the high and the low molecular weight polymers have high cis contents, with the low molecular weight polymer being at least 70 percent cis and the high molecular weight polymer being at least 92 percent cis. Desirably both polymers are made with a neodymium catalyst system. The blends provide a balance of properties including good snow traction, wet traction, and rolling resistance while providing a balance of good physical properties including tension at break, modulus etc.

SUMM The present invention relates to low molecular weight high-cis polybutadienes synthesized with a catalyst system that comprises a neodymium-containing compound, an organoaluminum hydride, and a halide source in combination with either an alkyl aluminoxane or a trialkyl aluminum compound. Blends of these low molecular weight high-cis polybutadienes and high molecular weight high-cis polybutadienes are further disclosed for use in tire tread compounds to enhance fracture properties, snow traction, wet traction, and rolling resistance of a tire.

SUMM Japanese Patent Publication 8-73515 discloses the polymerization of dienes with Group 3B metal (including neodymium) catalyst systems, wherein molecular weight regulators are not used in the polymerization process. The methods taught therein are applicable to a situation for making a high molecular weight high-cis polybutadiene with a narrow molecular weight distribution. But the method taught therein, as shown in the examples, generally produced a very broad molecular weight distribution if used to form a low molecular weight high-cis polybutadiene.

SUMM Moreover, it is known that low molecular weight polybutadienes can be blended with high molecular weight high-cis

polybutadienes. These known low molecular weight polybutadienes, however, having a broad molecular weight distribution and/or a reduced cis-1,4 content, cannot be readily used in these blends. For example, because of the broad molecular weight distribution, it is difficult to determine and/or optimize properties. In addition, miscibility becomes a problem when these liquid polybutadienes, varying significantly in the cis-1,4 content from a higher molecular weight polybutadiene, are used together in blends.

SUMM The effects of blends of these high molecular weight/low molecular weight (HMW/LMW) high-cis polybutadiene on the properties of a rubber compound have not been thoroughly investigated. Japanese Patent Publication No. 7-5789, published on the Aug. 6, 1987, disclosed blends of HMW/LMW polybutadiene for use in impact modified polystyrene. Further, Bridgestone Corporation has examined the use of HMW/LMW blends of low-cis polybutadiene for improved wet/snow properties. But nothing has disclosed blends of HMW/LMW blends of low-cis polybutadiene particularly beneficial for use in tread compositions.

SUMM Thus, there presently exists a need for a low molecular weight high cis-1,4 polybutadiene having properties suitable for blending with a high molecular weight high-cis polybutadiene, the resultant blend being useful in tire tread compounds.

SUMM In part, the present invention relates to a low molecular weight high cis-1,4 polybutadiene and an improved process for polymerization of dienes to a low molecular weight high-cis polybutadiene using either of two neodymium-based catalyst systems. One such catalyst system is referred to throughout as an MAO catalyst system-and comprises: (a) a neodymium -containing compound; (b) an aluminoxane; (c) an organoaluminum hydride compound; and (d) a halide source. While neodymium-based catalyst systems are known to produce high-cis polybutadiene, the use of these four catalyst components to yield a liquid high-cis polybutadiene with a narrow molecular weight distribution was not known. The catalyst system is operational under a variety of conditions.

SUMM Another such neodymium-based catalyst system disclosed herein, and referred to throughout as a TIBA catalyst system, comprises: (a) a neodymium-containing compound; (b) a trialkyl aluminum compound; (c) an organoaluminum hydride compound; and (d) a halide source. At least 80 weight percent of the resulting polydiene has a molecular weight less than 100,000. In addition, the polydiene has a number average molecular weight less than 35,000; and a ratio of Mp (peak molecular weight) to Mn (number average molecular weight) between about 0.9 and about 2.0. This catalyst system is useful where environmental considerations dictate against the use of hexane-insoluble aluminoxanes in the polymerization process.

SUMM Moreover, the present invention also relates to low molecular weight/ high-cis polybutadiene blends containing either of these low molecular weight high-cis polybutadienes. In this regard, the present invention relates to a high-cis polybutadiene blend, which comprises: (a) from about 20 to about 80 percent by weight of a first polybutadiene having a number average molecular weight from about 2000 to about 50,000 and a cis-1,4

microstructure content of at least 70 percent; and (b) from about 20 to about 80 percent by weight of a second polybutadiene having a number average molecular weight from about 90,000 to about 300,000, and a cis-1,4 microstructure content of at least 92 percent.

SUMM The present invention further relates to a rubber compound, which comprises at least 30 parts by weight of a high cis-1,4-polybutadiene based upon 100 parts by weight rubber wherein a) from about 20 to about 80 weight percent of the high cis-1,4-polybutadiene is a low molecular weight high-cis polybutadiene of the present invention has a molecular weight from about 2,000 to about 50,000 and a cis-1,4 content of at least 70 percent; and b) from about 20 to about 80 weight percent of the high cis-1,4-polybutadiene is a high molecular weight high-cis polybutadiene having a molecular weight from about 90,000 to about 300,000 and a cis-1,4-microstructure of at least 92 percent. Desirably these two fractions of high-cis polybutadiene represent distinct peaks (or modes) in the molecular weight distribution of the high-cis polybutadiene. Desirably the molecular weight distribution of the lower molecular weight peak is from about 1.1 to about 5 and the molecular weight distribution of the higher molecular weight peak in the distribution is from about 1.8 to about 6. These rubber characteristics facilitate achieving a balance of good fracture resistance, snow traction, wet traction, and low rolling resistance.

SUMM A process is disclosed below for producing low molecular weight high-cis polybutadiene with a specific molecular weight distribution by polymerizing 1,3-butadiene in the presence of either of two catalyst systems comprising: (a) a neodymium -containing compound; (b) an aluminoxane in the MAO catalyst system or a trialkyl aluminum compound in the TIBA catalyst system; (c) an organoaluminum hydride compound; and (d) a halogen source. Referring particularly to the MAO catalyst system, it differs from JP 8-73515 in that it teaches generally higher amounts of all of the catalyst components relative to the diene, preferred amounts of total aluminum relative to butadiene, and preferred catalyst preparation and aging procedures. One skilled in the art would not anticipate that the molecular weight could be reduced to the extent that liquid polybutadiene was produced without the use of molecular weight regulators. Evaluation of the ratio of the neodymium -containing compound and the total polymers formed in the examples reveals that multiple polymer chains are produced per each neodymium containing compound, so some mechanism of chain termination and chain initiation is taking place which has the same result as chain transfer without broadening the molecular weight distribution.

SUMM The molar ratio of the aluminoxane to the neodymium -containing compound (Al/Nd) in the MAO catalyst system can be varied from about 10 to about 500. However, a more preferred range of Al/Nd molar ratio is from about 40 or 50 to about 200, and the most preferred range is from about 75 to about 150. The molar amount of aluminoxane is the number of moles of Al--R.sup.5 units rather than the moles of the oligomer or cyclic aluminoxane. This is consistent with the effectiveness of aluminoxane in this type of catalyst system.

SUMM The catalyst components may be introduced into the polymerization system in several different ways. They may be added in either a stepwise or

simultaneous manner. It is desirable to add the halide source as the last component of the catalyst system and preferably after a portion of the total diene has been added. The order in which the components are added in a stepwise manner is not critical to achieve polymerization but may affect the number average molecular weight of the polymer. With respect to the MAO catalyst system, the components are preferably added in the order of the 1) part of the total diene, 2) aluminoxane , 3) neodymium-containing compound, and 4) organoaluminum hydride. As to the TIBA catalyst system, there is no preferred order for the addition of the components, but, again, the halide source must be added last in the polymerization. It is optional to age the reactants for a few seconds to minutes prior to the addition of the halide source. The catalyst components may be premixed outside the polymerization system at an appropriate temperature (e.g., from about 10° C. to about 90° C.), following by the addition of the catalysts to the polymerization system or the catalysts may be mixed in the polymerization reactor. The amount of diene, e.g.1,3-butadiene monomer, which is desirably added before the halide source, can range from about 10 to about 100 moles per mole of the neodymium-containing compound, and preferably should be from about 10 to about 50 moles per mole of the neodymium-containing compound.

SUMM It has been observed by others that increased aging time (after adding the halide source) for these types of initiators usually increases the activity of the catalyst. While preparing the examples it was observed that shorter catalyst aging times generate more polymer chains and consequently, reduce the molecular weight of the resulting polymers. Thus aging time is a compromise between catalyst activity and catalyst efficiency when producing low molecular weight polymers. It is desirable to age the catalyst (after adding the halide source) less than 30 minutes at a temperature of less than 50° C. and more desirably less than 10 minutes at from about 10 to about 50° C. after mixing all the catalyst components and part of the diene.

SUMM A major benefit of the MAO catalyst system process for forming low molecular weight (liquid) high-cis polybutadiene is the lack of added molecular weight regulators, which often decrease the rate of polymerization and lead to broad molecular weight distributions. The process is not, however, free of chain transfer reactions as a close examination of the experimental data will demonstrate that more moles of polymer are generated than can be explained based on the moles of the initiator.

SUMM The low molecular weight high-cis polybutadiene product produced by the above process has many applications. It can be blended with various rubbers in order to improve their properties. For example, it can be incorporated into elastomers in order to improve or modify their viscoelastic properties (such as G' and tan δ) at a particular temperature. It has been possible to increase the snow and wet traction of a rubber blend with this low molecular weight high cis-1,4 polybutadiene. These properties are generally correlated with a lower storage modulus (G') at -20° C. and a higher tan δ at 0° C. respectively when these properties are measured at 1 Hz and small strains.

SUMM More particularly, the addition of a blend of this low molecular weight high-cis polybutadiene and a high molecular weight high-cis to a rubber compound has been found to improve properties such as fracture resistance, snow traction, wet traction, and

rolling resistance. It is beneficial if the blend has a molecular weight distribution which has at least two modes, with a first mode having a maximum between a molecular weight of 2000 and 50,000 and a second mode having a maximum between a molecular weight of 90,000 and 300,000. It is particularly advantageous that both the high and low molecular weight polybutadienes have similar amounts of cis-1,4 repeating units as this results in enhanced compatibility of the two polymers over blends where the cis-1,4 content varies significantly between the high and low molecular weight polymers. While the high and low molecular weight polymers are generally characterized as two different materials, which are separately prepared, it is specifically acknowledged that due to the similarity in the catalyst systems used to prepare the high and low molecular weight polymers it is beneficial to make both the high and low molecular weight fractions in the same reactor or plant and/or blend them before isolating the polymers from their polymerization media.

SUMM The benefit from using a blend of high and low molecular weight high-cis polybutadiene is not limited to rubber compounds where the high and low molecular weight polybutadiene is 100% of the rubber component. In fact these polymers are easily blended with conventional rubbers used in tires. A blend of high and low molecular weight high-cis polybutadiene with one or more other rubbers may be optimized for a total balance of tire or tire tread properties. The weight percent of the high molecular weight high-cis polybutadiene is desirably from about 20 to about 80 percent, and is more desirably from about 25 to about 75 percent, and is preferably from about 30 to about 70 percent of the blend of high and low molecular weight high-cis polybutadienes.

SUMM The high molecular weight polybutadiene desirably has a molecular weight or a number average molecular weight from about 90,000 to about 300,000, more desirably from about 150,000 or 200,000 to about 280,000. By using molecular weight alternatively to number average molecular weight it is intended to provide alternative but nearly equivalent options in the claims. Desirably the molecular weight distribution (MWD or Mw/Mn) is from about 1.8 or 2.0 to about 6.0 and more desirably from about 1.8 to about 3.2. Desirably the high molecular weight polybutadiene has a cis-1,4 content of at least 92% and preferably at least 94%. Polymers of this type are commercially available or can be prepared by using catalyst systems based on nickel or neodymium carboxylates, trialkyl aluminum, and a compound with a labile halide. The weight percent of the high molecular weight high-cis polybutadiene is desirably from about 20 to about 80, and is more desirably from about 25 to about 75 percent, and is preferably from about 30 to about 70 percent of the blend of high and low molecular weight high-cis polybutadiene. The polybutadiene can tolerate small amounts of comonomers, e.g. less than1, 5, or 10 percent of another diene or another monomer, so long as the high molecular weight polybutadiene is compatible with the low molecular weight butadiene and other rubbers in the blend. By compatibility it is meant that the polymers can be mixed thoroughly without macroscopic phase separation.

SUMM The low molecular weight polybutadiene desirably has a molecular weight or number average molecular weight from about 2,000 or 4,000 to about 40,000 or 50,000, and is more desirably from about 5,000

to about 20,000 or 25,000. Desirably the molecular weight distribution is from about 1.1 to about 5, and is more desirably from about 1.2 or to about 2.2 . Desirably the cis-1,4 content is at least 70%, more desirably from about 70 to about 97%, preferably at least 85%, and is more preferably from about 85 to about 97%. Desirably the low molecular weight high-cis polybutadiene is from about 20 to about 80 weight percent of the blend of high and low molecular weight high-cis polybutadiene, and is more desirably from about 25 to about 75 weight percent and is preferably from about 30 to about 70 weight percent of the blend. The polybutadiene can tolerate small amounts of comonomers, e.g. less than 1, 5, or 10 percent of another diene or another monomer, so long as the low molecular weight polybutadiene is compatible with the high molecular weight polybutadiene and other rubbers in the blend.

SUMM Molecular weight and molecular weight distribution were obtained by using a GPC instrument equipped with two Tosoh GMHXL (30 cm) columns connected in line. THF was used as carrier solvent, with a flow rate of 1.0 mL/min. The instrument was universally calibrated with polystyrene standards and Mark-Howick constants for high-cis polybutadienes. Microstructures were obtained by FT-IR measurements. Spectra of CS.sub.2 solutions of polymers (0.5 w/v %) were obtained, and the microstructures were calculated by Morello's method

DETD The following examples 12-18 illustrate how to polymerize the low molecular weight high-cis polybutadiene of the present invention using a catalyst system comprising a trialkyl aluminum compound (i.e., the TIBA catalyst system).

DETD The results in Table VB predict that Control I, which contains a low-cis polybutadiene, improves snow and wet traction as well as the rolling resistance over Control 2, which is a blend of natural rubber and styrene-butadiene rubber. In this case, the improvements in the listed properties were obtained at the expense of a compromise in tension at break and the elastic modulus at 300% elongation. Samples A-E illustrate that the traction and rolling resistance can be increased relative to Control 2 without a substantial compromise in other properties by using a high-cis polybutadiene. The HMW polybutadiene in Samples D and E (made with a Ni catalyst) had broader molecular weight distributions and slightly lower cis-1,4 content than the HMW polybutadiene in Samples A-C (made with Nd catalyst). The LMW polybutadiene in Samples D and E also had broader MWD (Sample D) or lower cis-1,4 content (Sample E). The results for TB, M300 and EB were slightly lower for Samples D and E. The LMW polybutadiene of Sample C had a much broader molecular weight distribution than the LMW polybutadiene of Samples A and B. The LMW polybutadiene of Samples A and B was prepared following the general procedure outlined in Example 1.

CLM What is claimed is:

19. A process for polymerizing a low molecular weight polydiene in the liquid comprising: polymerizing a conjugated diene in the presence of a catalyst comprising an effective amount of a neodymium -containing compound; an organoaluminum hydride; a source; and an aluminum-containing compound selected from the group consisting of an aluminoxane and a trialkyl aluminum compound to generate at least one polymer chain per 1000 conjugated diene molecules.

20. A process according to claim 19, wherein the mole ratio of said aluminoxane to said neodymium is from about 10 to about 500 when said aluminoxane is selected as said aluminum-containing compound.

21. A process according to claim 19, wherein the mole ratio of said organoaluminum hydride to said neodymium is from about 10 to about 100 when said aluminoxane is selected as said aluminum-containing compound.

22. A process according to claim 19, wherein the mole ratio of said halide source to said neodymium is from about 1 to about 15 when said aluminoxane is selected as said aluminum-containing compound.

26. A process according to claim 19, wherein said neodymium -containing compound, aluminoxane, organoaluminum hydride, and halide source are premixed with less than 10 mole percent of the total conjugated diene and reacted with said conjugated diene at a temperature between 10 and 90° C. prior to the addition of the remainder of the conjugated diene.

36. A high-cis polybutadiene blend comprising: (a) from about 20 to about 80 percent by weight of a first polybutadiene having a number average molecular weight from about 2000 to about 50,000, and a cis-1,4 microstructure content of at least 70 percent; and (b) from about 20 to about 80 percent by weight of a second polybutadiene having a number average molecular weight from about 90,000 to about 300,000, and a cis-1,4 microstructure content of at least 92 percent.

48. The blend according to claim 36, wherein the weight percent of the second polybutadiene is from about 30 percent to about 70 percent of the high-cis polybutadiene blend.

49. The blend according to claim 48, wherein the weight percent of the first polybutadiene is from about 30 percent to about 70 percent of the high-cis polybutadiene blend.

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TITLE: Continuous process for the production of conjugated diene polymers having narrow molecular weight distribution and products therefrom

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CAS INDEXING IS AVAILABLE FOR THIS PATENT.

SUMM Lanthanide-based catalysts are used to prepare high cis-1,4-polybutadiene. These catalyst systems are typically formed by combining a lanthanide salt, an organoaluminum compound, and a source of halogen. They typically give polymers having a cis-1,4-linkage content of greater than 93% cis microstructure.

SUMM Others have employed a silicon halide or organosilicon halide as the source of halogen, and then aged the catalyst system for at least 5 hours prior to contacting with the conjugated dienes to be polymerized. This approach, however, increases the manufacturing cost of the polymer.

DETD Conjugated diene monomers are continuously polymerized in hydrocarbon solvent by using a lanthanide-based catalyst composition. Generally, the catalyst composition is formed by combining (a) a lanthanide compound, (b) an alkylating agent, and (c) a halogen-containing compound. The monomer and catalyst composition or ingredients are charged to a continuous-type reactor that allows for backmixing of the polymeric intermediates, which results in the polymers having narrow, monomodal molecular weight distributions and high cis-1,4-linkage contents. This backmixing also increases the degree of living properties of the polymers, which allows them to be functionalized.

DETD Conjugated diene monomers are generally unsaturated compounds having two or more double bonds that alternate with single bonds. Examples of conjugated diene monomers include 1,3-butadiene, isoprene, 1,3-pentadiene, 1,3-hexadiene, 2,3-dimethyl-1,3-butadiene, 2-ethyl-1,3-butadiene, 2-methyl-1,3 pentadiene, 3-methyl-1,3-pentadiene, 4-methyl-1,3-pentadiene, and 2,4-hexadiene. Mixtures of two or more conjugated dienes may also be utilized in co-polymerization. The preferred conjugated dienes are 1,3-butadiene, isoprene, 1,3-pentadiene, and 1,3-hexadiene. The most preferred monomer is 1,3-butadiene because the polymerization of this monomer according to this invention provides narrow molecular weight high cis-1,4-polybutadiene that has narrow molecular weight distribution.

DETD The catalyst composition of this invention has very high catalytic activity for polymerizing conjugated dienes into stereoregular polydienes over a wide range of catalyst concentrations and catalyst ingredient ratios. The polymers having the most desirable properties, however, are obtained within a narrower range of catalyst concentrations and catalyst ingredient ratios. Further, it is believed that the catalyst ingredients (a), (b), and (c) may interact to form an active catalyst species. Accordingly, the optimum concentration for any one catalyst ingredient is dependent upon the concentrations of the other catalyst ingredients. The molar ratio of the alkylating agent to the lanthanide compound (alkylating agent/Ln) can be

varied from about 1:1 to about 200:1, more preferably from about 2:1 to about 100:1, and even more preferably from about 5:1 to about 50:1.

DETD In another embodiment, the catalyst composition comprises (a) a lanthanide compound, and (b) an aluminoxane, with the proviso that the molar ratio of the aluminoxane to the lanthanide compound (Al/Ln) is from about 50:1 to about 50,000:1, preferably from about 75:1 to about 30,000:1, and more preferably from about 100:1 to about 1,000:1, where the molar ratio refers to equivalents of aluminum atoms on the aluminoxane to equivalents of lanthanide atoms in the lanthanide compound. Useful lanthanide compounds, and aluminoxanes, are described above.

DETD In yet another embodiment, the catalyst composition comprises (a) a lanthanide compound, (b) an alkylating agent, and (c) a non-coordinating anion or non-coordinating anion precursor. Useful lanthanide compounds, and alkylating agents, are described above. Useful molar ratios of non-coordinating anion or non-coordinating anion precursor to lanthanide compound (An/Ln) include from about 0.5:1 to about 20:1, preferably from about 0.75:1 to about 10:1, and more preferably from about 1:1 to about 6:1.

DETD Third, and most preferred, the catalyst composition may be formed by using a pre-forming process. According to this process, a small amount of monomer within solution is contacted with the alkylating agent within a feed line. This combination of monomer and alkylating agent is then contacted with the lanthanide compound, and subsequently the halogen-containing compound is introduced into the feed line. This in-line combination preferably occurs at a temperature of about -20° C. to about 80° C. Also, once the halogen-containing compound is introduced into the feed line, the preformed catalyst is preferably introduced into the continuous reactor within less than about 10 minutes. The amount of conjugated diene monomer that is used for pre-forming the catalyst can range from about 1 to about 500 moles per mole, more preferably from about 5 to about 250 moles per mole, and even more preferably from about 10 to about 100 moles per mole of the lanthanide compound. The major portion of the monomer to be polymerized is introduced into the polymerization reactor via a separate feed line. Advantageously, by pre-forming the catalyst composition in this manner, it has been found that higher polymer yield can be obtained at lower agitation speeds. While the lower agitation speeds may not ultimately impact the degree of backmixing, i.e., the non-ideal flow of the molecules within the reactor, the degree of agitation has been found to impact polymer yield where the catalyst composition is not pre-formed according to the preferred method. Accordingly, one benefit to pre-forming the catalyst in this manner is the reduced amount of energy required to agitate the polymerization mixture within the reactor.

DETD In accordance with the teachings of this invention, high cis-1,4-polybutadiene was prepared by employing continuous polymerization techniques and a catalyst system that was formed by combining neodymium neodecanoate, triisobutylaluminum, and ethylaluminum dichloride. Specifically, the triisobutylaluminum and neodymium neodecanoate were added to a monomer stream of 1,3-butadiene monomer (within hexanes) and subsequently added to the polymerization reactor. In a second feed line, the ethylaluminum dichloride within technical hexanes was introduced into the continuous polymerization reactor. The molar ratio of the triisobutylaluminum to the neodymium neodecanoate was about 15:1, and the molar ratio of the ethylaluminum dichloride to the neodymium neodecanoate was about 2:1. The 1,3-butadiene monomer

concentration within the first feed line was about 15% by weight. The amount of neodymium neodecanoate added to the feed stream was about 0.22 mmol per 100 g of monomer. The polymerization temperature was maintained at about 93° C. and the blades within the reactor were operated at about 100 rpm. The resulting polymer yield was about 90.6%.

CLM What is claimed is:

10. The process of claim 1, where the catalyst composition is charged to the continuous reactor as a pre-formed catalyst composition that is formed by combining the lanthanide compound, the alkylating agent, and the halogen-containing compound, and optionally a conjugated diene monomer prior to introducing the catalyst ingredients into the continuous reactor.

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